12.75-13.25 GHz

Allocation to Services		
Region 1	Region 2	Region 3
12.75 - 13.25	FIXED FIXED-SATELLITE (Earth-to-space) 792A FIXED-SATELLITE (space-to-Earth) MOBILE Space Research (deep space) DDD VVV ZZZ	

NOC 792A The use of the bands 4500-4800 MHz, 6725-7025 MHz, 10.7-10.95 GHz, 11.2-11.45 GHz and 12.75-13.25 GHz by the fixed-satellite service shall be in accordance with the provisions Appendix **30B.**

ADD DDD The use of the band 12.75-13.25 GHz by the fixed-satellite service (space-to-Earth) is limited to non-GSO mobile-satellite service feeder links and is subject to the application of the coordination and notification procedures set forth in Resolution 46. The provisions of RR 2613 do not apply to the use by the fixed-satellite service (space-to-Earth).

ADD VVV The power flux-density produced at and within ±5° of the Geostationary satellite orbit by a non-GSO space station operating in the mobile-satellite service shall not exceed -168 dBW/m^2/4 kHz.

15.4-15.7 GHz

Allocation to Services		
Region 1	Region 2	Region 3
AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE (Earth-to-space)(space-to-Earth) 797C 797D 733 797		

ADD 797C The use of the band 5000 - 5250 MHz (Earth-to-space) and 15.4 -15.7 GHz (Earth-to-space) (space-to-Earth) by the fixed-satellite service is limited to feeder links for non-Geostationary satellite systems of the mobile-satellite service. The provisions of No. 2613 do not apply to these fixed-satellite allocations.

ADD 797D The use of the bands 5000 - 5250 MHz (Earth-to-space) and 15.4-15.7 GHz (Earth-to-space) (space-to-Earth) by the fixed-satellite service is subject to the application of the coordination and notification procedures set forth in Resolution 46 [suitably modified], for coordination between non-Geostationary satellite networks (Earth-to-space) and between non-Geostationary satellite networks (Earth-to-space) and terrestrial services.

NOC 733 The bands 1 610-1 626.5 MHz, 5 000-5 250 MHz and 15.4-15.7 GHz are also allocated to the aeronautical mobile-satellite (R) service on a primary basis. Such use is subject to agreement obtained under the procedure set forth in Article 14.

NOC 797 The bands 5 000-5 250 MHz and 15.4-15.7 GHz are also allocated to the fixed-satellite service and the inter-satellite service, for connection between one or more earth stations at specified fixed points on the Earth and space stations, when these services are used in conjunction with the aeronautical radionavigation and/or aeronautical mobile (R) service. Such use shall be subject to agreement obtained under the procedure set forth in Article 14.

4.6.2 NGSO MSS Feeder Link Allocation Proposals for Frequency Bands Above 17.7 GHz for MSS Systems Intending to Operate Service Links in the 1-3 GHz MSS Bands

As was highlighted in the PREFACE to this Final Report, IWG-4 only considered feeder link allocation proposals for MSS systems intending to operate service links in the 1-3 GHz MSS bands. Under that limited scope, no consideration was given by IWG-4 to other MSS systems intending to operate service links in other frequency bands. As such, Teledesic Corporation could not agree to the proposals contained in this section of the Final Report.

IWG-4 attempted, on several occasions, to arrive at a consensus position on NGSO MSS feeder link proposals for co-directional operation between NGSO MSS and GSO FSS in the 20/30 GHz bands. This topic proved to be very difficult for the IWG for a number of reasons and, in the end, it was not possible to achieve a consensus position on this issue. Outlined below are elements which contributed to the failure of the group to reach consensus.

Possibility of Co-Directional Sharing Between NGSO MSS and GSO FSS Systems

In attempting to validate whether co-directional, co-frequency sharing would be possible between NGSO MSS systems intending to operate service links in the 1-3 GHz MSS bands and GSO FSS systems at 20/30 GHz, a number of highly sophisticated sharing studies were performed. These studies involved the use of computer and analytical models of NGSO MSS feederlink and GSO FSS system satellite constellations and statistical calculations of potential interference levels between various systems. It is understood that for the case of co-directional, co-frequency sharing between NGSO and GSO systems, interference events will occur due to the natural coupling between the system geometries. The primary questions

became, how much coupling could be considered acceptable and, were there viable mitigation techniques which could be employed to alleviate any objectionable interference results? In the end, there was no agreement on the level of interference that could be considered as acceptable and there were quite varied opinions on the viability and or practicability of the potential mitigation techniques. It was agreed that further study is warranted before final conclusions can be drawn on whether sharing between NGSO MSS systems, for MSS systems intending to operate service links in the 1-3 GHz MSS bands, and GSO FSS systems is possible.

Ka Band Allocation Options

The ITU-R, after all of its many deliberations, concluded that there were essentially two options available for the provision of spectrum for NGSO MSS feeder links at 20/30 GHz, and IWG-4 has endorsed those two options (See Section 4.5.2.2.2). Under one option an allocation would be made by affording NGSO MSS feeder links equal status with existing and future GSO FSS networks. Under the second option, in certain portions of the frequency bands, the NGSO MSS feeder links would be afforded equal status with existing GSO FSS networks but would be given a primary status over future GSO FSS networks which would have a secondary status in those certain portions of the frequency bands. Examples of allocation proposals for each of these 2 options are contained in the following sections of this report.

In the following sections the views and proposals of some of the GSO, and some of the NGSO, members of IWG-4 are presented. Section 4.6.2.1 represents the opinions of GSO interests and does not represent a consensus view within, or a consensus proposal from, IWG-4. Section 4.6.2.2 represents the opinions of the licensed NGSO MSS system representatives, for MSS systems intending to operate service links in the 1-3 GHz MSS bands, and does not represent a consensus view within, or a consensus proposal from, IWG-4.

4.6.2.1 Example Ka Band Allocation Proposal Under Option 1 (Equal Status) as Defined in Section 4.5.2.2.2 of IWG-4 Final Report

A co-directional allocation of 400 MHz near 19 GHz and 29 GHz as proposed in RR No. 872A below, and a reverse band allocation of 300 MHz near 20 GHz as proposed in RR No. 872B, below, when coupled with a suitable space-to-Earth allocation below 17.7 GHz, could satisfy the bandwidth requirements of all six contemplated U.S. Ka-band NGSO MSS networks that use service links in the 1-3 GHz range (see Section 4.2.2). This would assume that, as indicated in the available sharing studies (e.g., Doc. CPM95/53, US input), pairs of these networks may be able to share the same frequencies. The reverse band allocation would result in minimal impact on Geostationary orbit and spectrum resources, provided that the deployment density of the feeder link earth stations is low, as indicated in the applications before the FCC; thus, the provisions of RR No. 2613 or potential modified versions thereof can be waived in the reverse band allocation.

One U.S. NGSO MSS feeder link network, intending to operate service links in the 1-3 GHz MSS bands, has been proposed for operation at 19.4-19.6/29.1-29.3 GHz on a co-directional basis (Iridium); that requirement of 200 MHz in each direction of transmission comprises about 100 MHz of spectrum occupancy and 100 MHz for facilitation of coordination with respect to other networks. Another U.S. NGSO MSS network, intending to operate service links in the 1-3 GHz MSS bands, originally proposed feeder link operation in the 19.8-20.1/29.7-30.0 GHz bands (Odyssey); however, it was since agreed to accommodate this 300 MHz spectrum requirement in each direction either in proximity to the foregoing 100 MHz requirement or in a reverse band allocation , e.g., No. 872B, below. AMSC's proposed Ka-Band feeder links would use 200 MHz in each direction, shared with GSO FSS satellites, or could be accommodated at lower frequencies on a reverse band basis.

To accommodate these and other co-directional spectrum requirements, the proposal below includes RR No. 872A for allocations of 400 MHz in each direction, under the terms described as "Option 1" in the CPM Report. This allocation package (co-directional and reverse band) provides spectrum substantially exceeding the maximum requirement stated in Section 4.2.2 of this report (i.e., 700 MHz provided versus 250-500 MHz stated requirement), which is sufficient for several U.S. and foreign NGSO MSS feeder link networks regardless of their ability to share frequencies with one another.

Although all of the sharing studies submitted to IWG-4 by Hughes, CSC, and NASA confirm the CPM-95 conclusion that co-directional sharing between the proposed U.S. NGSO MSS feeder link networks, intending to operate service links in the 1-3 GHz MSS bands, and GSO FSS networks in the 20/30 GHz bands is feasible with certain constraints, it is possible for a foreign NGSO MSS network to propose system parameters (and negotiate during coordination in a manner) that would preclude sharing with GSO FSS systems. Thus, although U.S. GSO interests have agreed that RR 2613 can be waived in the bands designated for co-directional use by NGSO MSS feeder link networks with service links in the 1-3 GHz range, criteria for sharing between NGSO MSS feeder links and GSO FSS networks would have to be applied to ensure that such sharing can be realized in practice. This is accomplished through No. 872C and No. 872H, below, which would help ensure that foreign NGSO MSS feeder link networks can share with GSO FSS networks at least as well as the U.S. NGSO MSS networks that have been studied. These footnotes are analogous in nature to footnotes 855A and 855B adopted by WARC-92 at 13.75-14.00 GHz.

As noted above, the co-directional sharing between NGSO MSS feeder links and GSO FSS networks proposed in 872A below would be governed by sharing criteria and coordination procedures as described under "Option 1" for co-directional sharing above 17.7 GHz in Section 4.2.4.2 of the CPM-95 Report. Under this

option , NGSO MSS feeder links would enjoy co-primary status with GSO FSS networks. Appropriate sharing criteria, in addition to that of No.s 872C and 872H, should be developed in ITU-R Study Group 4 in collaboration with NGSO MSS proponents to ensure against the prospects of frequent and unnecessary coordinations, or of requiring NGSO MSS feeder link networks to accommodate GSO FSS interference beyond their ability to do so.

The relationship between the NGSO MSS feeder links and GSO FSS networks would be entirely different under "Option 2" as described in the same section of the CPM-95 Report and proposed by NGSO MSS proponents. Under Option 2, GSO FSS systems would be made explicitly secondary to NGSO MSS feeder links in designated bands. The latter systems would be relieved of any incentive to include the capability for interference mitigation in their system designs, or to exercise that capability if appropriate. Without the use of such interference mitigation capabilities, sharing would indeed be impossible and the burdens and risks to GSO FSS systems would be prohibitively high.

18.8 - 19.7 GHz

Allocation to Services		
Region 1	Region 2	Region 3
18.8-19.7	FIXED FIXED-SATELLITE (space-to-Earth) 872A 872C MOBILE 872B	

ADD RR 872A The use of the bands 19.2 - 19.6 GHz (space-to-Earth) and 29.1 - 29.5 GHz (Earth-to-space) by feeder links of networks in the mobile-satellite service using non-Geostationary space stations is subject to the coordination procedures specified in Resolution 46 (MOD). The provisions of No. 2613 (MOD) do not apply.

ADD RR 872B The band 18.8 - 19.1 GHz is also allocated to the fixed-satellite (Earth-to-space) service on a primary basis for accommodation of feeder links of networks in the mobile-satellite service using non-Geostationary space stations. Such use is subject to the coordination procedures specified in Resolution 46 (MOD). The provisions of No. 2613 (MOD) do not apply.

ADD RR 872C In the band 19.2 - 19.6 GHz, the power flux density produced at the surface of the Earth by non-Geostationary space stations shall exceed [minimum of values proposed for Iridium and Odyssey] (i.e., see also RR No.s 2577 - 2580.1). The antennas of earth stations associated with those space stations shall have a diameter of at least [minimum value proposed for Iridium and Odyssey].

28.5-29.5 GHz

Allocation to Services		
Region 1	Region 2	Region 3
28.5-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 882D <u>872A</u> <u>882H</u> MOBILE Earth Exploration-Satellite (Earth-to-space) 882C 882B	

ADD RR 882H In the band 29.1 - 29.5 GHz, the e.i.r.p. density of earth stations operating with non-Geostationary space stations shall be at least [minimum value proposed for Iridium and Odyssey], and should not exceed [peak value proposed for Iridium and Odyssey]. The antennas of these earth stations shall have a diameter of at least [minimum value proposed for Iridium and Odyssey].

4.6.2.2 Example Ka Band Allocation Proposal Under Option 2 (Primary MSS) as Defined in Section 4.5.2.2.2 of IWG-4 Final Report

This section contains the NGSO MSS feeder link allocation proposal for frequency bands above 17.7 GHz that the proponents of NGSO MSS satellite systems with service links in the 1-3 GHz MSS bands support for inclusion in the United States proposals for WRC-95. The FCC has licensed three NGSO MSS systems to operate service links in the MSS spectrum at 1610-1626.5 MHz and 2483.5-2500 MHz that was allocated in Regions 1, 2, and 3 at WARC-92, and has deferred action on three additional system applications until January, 1996. The FCC is also proposing to activate WARC-92 allocations and to make other assignments to the global MSS in the 2 GHz bands, and has solicited public comment on whether these bands should be used for NGSO MSS as well. Administrations other than the United States have announced intentions to establish NGSO MSS systems with service links in the 1-3 GHz MSS bands, and several are in fact moving forward with such systems on a time table similar to those of the recently licensed U.S. systems. The FCC has stated that it is committed to ensuring that sufficient spectrum in the fixed-satellite service (FSS) bands be allocated or otherwise made available at WRC-95 to accommodate the feeder link requirements of the three NGSO MSS Above 1 GHz licensees, along with the requirements of the three applicants whose systems may be licensed sometime after January 31, 1996.

The ability of NGSO MSS system feeder links to share spectrum on a co-directional basis with the GSO FSS has been the subject of discussions both within the United States and in the appropriate ITU fora. At this time, there are several studies and computer simulations that show that through the application of interference mitigation techniques, it may be possible for some co-directional sharing between NGSO MSS feeder links, for MSS systems intending to operate service links in the 1-3 GHz MSS bands, and GSO FSS systems to occur. There are also studies and simulations that show that such sharing will be difficult to implement if

it can be done at all, and early feedback from attempts to coordinate NGSO MSS feeder links and GSO FSS systems confirms the scope of the task ahead. Moreover, it is also the case that even if the likelihood of co-directional sharing between a single NGSO MSS feeder link system and a single GSO FSS system is feasible (this is the thrust of all of the simulations and studies undertaken to date), the expectation is that the techniques that would be employed to enable such one-on-one sharing have only a limited capacity to promote sharing, and that once a certain and likely low number of additional GSO FSS systems are factored in, the ability of the NGSO MSS system to continue to operate with the required degree of reliability will end. In other words, as the Geostationary arc at Ka-band approaches the orbital congestion that characterizes the FSS bands below 17.7 GHz, the same bars to co-directional sharing that now preclude NGSO MSS feeder link operation in those bands will arrive at Ka-band. Further compounding matters is the fact that none of the studies and simulations done to date has taken into account the Fixed Service, which will further diminish sharing possibilities.

Two of the three licensed NGSO MSS systems have proposed to use 200 MHz and 300 MHz of spectrum in each direction at Ka-band. These applications were filed with the FCC in 1990 and 1991. At that time, and for several years hence, only one commercial GSO system was proposed in these bands by U.S. interests. Only recently have new U.S. proposals and expressions of interest emerged for GSO FSS systems in the Ka-bands. The finalization of feeder link allocations for NGSO MSS systems has been a priority of the United States for WRC-95 as it is one of the necessary last steps to full implementation of the service link MSS allocations at 1-3 GHz that were championed by the United States at WARC-92.

In an effort to provide the necessary certainty for long term operation that the NGSO MSS systems require, while minimizing the impact that the provision of such certainty would cause in the 2.5 GHz of spectrum in each direction that is the Ka-

band FSS allocation, the NGSO MSS proponents have devised a comprehensive, streamlined proposal that both represents a substantial compromise and adjustment by one of the system proponents, and that already has the advantage of having been identified as the preferred Ka-band feeder link alternative in the recently completed Report of the CPM to WRC-95. Specifically, one of the NGSO MSS systems had proposed and advocated the co-directional use of 300 MHz of spectrum in both the 29.5-30.0 GHz and 19.7-20.2 GHz bands for its feeder links, while another had spearheaded the development and approval of the proposal for a primary allocation of 500 MHz of spectrum (20% of the available band) in each direction (i.e., at 29.0-29.5 GHz and 19.2-19.7 GHz) for NGSO MSS feeder links of systems with their service links in the 1-3 GHz range. In a significant effort to forge the most beneficial and least disruptive U.S. proposal possible, the proponent of a feeder link allocation at 29.5-30.0 GHz and 19.7-20.2 GHz agreed, for purposes of the U.S. preparations for WRC-95, to bring itself within the proposed dedicated feeder link allocation at 29.0-29.5 GHz and 19.2-19.7 GHz.

The GSO FSS interests in IWG-4 were unwilling to accept a dedicated primary allocation to NGSO MSS feeder links in any form. They insist, on the basis of the preliminary and incomplete studies and assessments that have been conducted to date, that co-directional sharing is possible. The realities of the situation, however, are twofold: (1) if the GSO FSS interests are incorrect in their assessment that co-directional sharing is possible, the burden on NGSO MSS systems -- both in terms of the prospect of never-ending coordinations and with respect to the requisite certainty to establish commercially viable systems -- is profound; and (2) if action is not taken to allocate spectrum for NGSO MSS feeder links at WRC-95, the opportunity will likely have passed, and the half-decade long quest of the NGSO MSS systems (not to mention the accomplishments won at WARC-92) will have been for naught. On the other hand, if the proposed designation of 500 MHz of primary spectrum in each direction is made to the NGSO MSS feeder links, and the GSO FSS interests are correct in their assessment that co-directional sharing is

possible, such systems should be able to demonstrate the absence of harmful interference and thus would be able to use the NGSO MSS bands on a co-directional basis anyway. The burdens and risks associated with the NGSO MSS system proponents' proposal is therefore negligible for the GSO FSS community.

In view of the foregoing preamble, the proponents of NGSO MSS systems with service links in the 1-3 GHz range call upon the United States to continue to strongly pursue the option -- identified by TG 4/5 and carried through in the Report of the CPM to WRC-95 -- that states a preference for the allocation of designated spectrum in each direction (which the MSS licensees would prefer to be at 29.0-29.5 GHz and 19.2-19.7 GHz) for primary NGSO MSS feeder links. In these bands, the requirements of RR 2613 would be inapplicable to this allocation, the allocation itself would be subject to the provisions of Resolution 46 (as suitably modified), and the recommendation in the CPM Report regarding harmful interference to and/or from NGSO MSS networks and GSO FSS networks shall apply. Appropriate changes to the Table of Allocations (RR Art. 8) to reflect this proposal are identified below:

GHz
19.2-19.7

MOD

Allocation To Services		
Region 1	Region 2	Region 3
19.2-19.7	FIXED FIXED-SATELLITE (space-to-Earth) 872C MOBILE 872E	

ADD 872C: The band 19.2-19.7 GHz (space-to-Earth) may also be used by the fixed-satellite service on a primary basis for feeder links for non-Geostationary satellite systems in the mobile-satellite service. The provisions of No. 2613 do not apply to this fixed-satellite allocation in the space-to-Earth direction of transmission.

ADD 872E The use of the band 19.2-19.7 GHz (space-to-Earth) by the fixed-satellite service is subject to the application of the coordination and notification procedures set forth in Resolution 46 [suitably modified], for the coordination between Geostationary networks (space-to-Earth) and non-Geostationary satellite networks (space-to-Earth), between non-Geostationary satellite networks (space-to-Earth), and between non-Geostationary satellite networks (space-to-Earth) and terrestrial services. Stations of Geostationary fixed-satellite networks brought into use in the band 19.2-19.7 GHz after November xx, 1995 shall not claim protection from and shall not cause harmful interference to non-Geostationary mobile-satellite service feeder link networks in this band.

GHz
28.5-29.5

MOD

Allocation To Services		
Region 1	Region 2	Region 3
28.5-29.0	FIXED FIXED-SATELLITE (Earth-to-space) 882D MOBILE Earth Exploration-Satellite (Earth-to-space) 882C 882B	
29.0-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 882D 882E 882F MOBILE Earth Exploration-Satellite (Earth-to-space) 882C 882B	

NOC 882B 882C 882D

ADD 882E: The fixed-satellite service allocation at 29.0-29.5 GHz (Earth-to-space) may also be used on a primary basis for feeder links for non-Geostationary satellite systems in the mobile-satellite service. The provisions of RR 2613 do not apply to this fixed-satellite allocation in the Earth-to-space direction of transmission.

ADD 882F: The use of the band 29.0-29.5 GHz (Earth-to-space) for feeder links for non-Geostationary satellite networks is subject to the application of the coordination and notification procedures set forth in Resolution 46 [suitably modified], for the coordination between Geostationary networks (Earth-to-space) and non-Geostationary satellite networks (Earth-to-space), between non-Geostationary satellite networks (Earth-to-space), and between non-Geostationary satellite networks (Earth-to-space) and terrestrial services. Stations of Geostationary fixed-satellite networks brought into use in the band 29.0-29.5 GHz after November xx, 1995 shall not claim

protection from and shall not cause harmful interference to non-Geostationary mobile-satellite service feeder link networks in this band.

4.6.2.3 Example Reverse Direction of Transmission Ka Band Allocation Proposal as Defined in Section 4.5.2.2.2 of IWG-4 Final Report

This section contains a proposal for reverse direction use of frequencies above 17.7 GHz for NGSO MSS feeder links. As an additional allocation alternative, and one that would enable the United States to have the flexibility to satisfy current and future feeder link requirements, IWG-4 believes that the United States should strongly pursue the possibility that non-GSO MSS feeder links can make bi-directional use of spectrum in the 18.8-19.7 GHz band (i.e., in the Earth-to-space direction) paired with a suitable band or bands below 17.7 GHz for space-to-Earth transmissions on a co-directional or bi-directional basis. The amount of spectrum to be allocated for reverse-band use at 18.8-19.7 GHz should be maximized, as it will provide needed flexibility to Geostationary and non-Geostationary satellite systems that will have to coordinate in this band under Resolution 46, and the prospects of bi-directional operation by NGSO MSS systems and GSO FSS systems appear to be good. This proposed use of spectrum is fully consistent with the conclusions advanced in the TG 4/5 Report and carried through in the Report of the CPM to WRC-95. (Reverse-band use of the 27.5-30.0 GHz band is not considered practical at this time.) Once again, the requirements of RR 2613 would not apply to this allocation (which would be on a co-primary basis), the allocation itself would be subject to the provisions of Resolution 46, as suitably modified, and the TG 4/5 Report recommendation regarding harmful interference to and/or from NGSO MSS networks and GSO FSS networks shall apply. Appropriate changes to the Table of Allocations (RR Art. 8) to reflect this proposal (along with the proposals already advanced in Section 4.6.2.2 above) are identified below:

GHz
18.8-19.7

MOD

Allocation To Services		
Region 1	Region 2	Region 3
18.8-19.2	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 872A MOBILE 872B	
19.2-19.7	FIXED FIXED-SATELLITE (space-to-Earth) 872C (Earth-to-space) 872D MOBILE 872E 872F	

ADD 872A: The use of the band 18.8-19.2 GHz (Earth-to-Space) by the fixed-satellite service is limited to feeder links for non-Geostationary satellite systems in the mobile-satellite service. The provisions of No. 2613 do not apply to these fixed-satellite allocations in the Earth-to-space direction of transmission.

ADD 872B: The use of the band 18.8-19.2 GHz (Earth-to-space) by the fixed satellite service for feeder links for non-Geostationary satellite networks is subject to the coordination and notification procedures set forth in Resolution 46 [suitably modified], for the coordination between Geostationary satellite networks (space-to-Earth) and non-Geostationary satellite networks (Earth-to-space), between non-Geostationary satellite networks (Earth-to-space), and between non-Geostationary satellite networks (Earth-to-space) and terrestrial services.

ADD 872C: The band 19.2-19.7 GHz (space-to-Earth) may also be used by the fixed-satellite service on a primary basis for feeder links for non-Geostationary satellite systems in the mobile-satellite service. The provisions of No. 2613 do not apply to this fixed-satellite allocation in the space-to-Earth direction of transmission.

ADD 872D: The use of the band 19.2-19.7 GHz (Earth-to-Space) by the fixed-satellite service is limited to feeder links for non-Geostationary satellite systems in

the mobile-satellite service. The provisions of No. 2613 do not apply to these fixed-satellite allocations in the Earth-to-space direction of transmission.

ADD 872E The use of the band 19.2-19.7 GHz (space-to-Earth) by the fixed-satellite service is subject to the application of the coordination and notification procedures set forth in Resolution 46 [suitably modified], for the coordination between Geostationary networks (space-to-Earth) and non-Geostationary satellite networks (space-to-Earth), between non-Geostationary satellite networks (space-to-Earth), and between non-Geostationary satellite networks (space-to-Earth) and terrestrial services. Stations of Geostationary fixed-satellite networks brought into use in the band 19.2-19.7 GHz after November xx, 1995 shall not claim protection from and shall not cause harmful interference to non-Geostationary mobile-satellite service feeder link networks in this band.

ADD 872F: The use of the band 19.2-19.7 GHz (Earth-to-space) by the fixed satellite service for feeder links for non-Geostationary satellite networks is subject to the coordination and notification procedures set forth in Resolution 46 [suitably modified], for the coordination between Geostationary satellite networks (space-to-Earth) and non-Geostationary satellite networks (Earth-to-space), between non-Geostationary satellite networks (Earth-to-space), and between non-Geostationary satellite networks (Earth-to-space) and terrestrial services.

APPENDIX 4.7.1
WRC-95 Advisory Committee
Informal Working Group 4
Feeder Links
Document List

Doc. No.	Document Title	Date	Originator/Author
IWG-4/1	IWG-4 Terms of Reference	6/16/94	WRC-95 IAC
IWG-4/2 (Rev1)	IWG-4 Work Program	7/5/94	WRC-95 IAC
IWG-4/3	TG 4/5 Draft Contribution to CPM (Doc 4-5/TEMP/14) "Regulatory/Procedural Provisions for Non-GSO MSS Feeder Link Networks"	6/16/94	ITU-R TG 4/5
IWG-4/4	TG 4/5 Draft Contribution to CPM (Doc 4-5/TEMP/16 (Rev 1) "Current Use of FSS Allocations and Related Procedures"	6/16/94	ITU-R TG 4/5
IWG-4/5	TG 4/5 Draft Contribution to CPM (Doc 4-5/TEMP/23) "Characteristics of MSS Feeder Links and Typical GSO/FSS Carriers"	6/16/94	ITU-R TG 4/5
IWG-4/6	TG 4/5 Doc 4-5/TEMP/24 Table Containing Provisional Categorization of FSS Bands Between 3 and 31 GHz	6/16/94	ITU-R TG 4/5
IWG-4/7	Meeting Schedule for IWGs 1-5	7/5/94	WRC-95 IAC
IWG-4/8	Preferred FSS Bands for NGSO MSS Feeder Links	7/5/94	COMSAT Mobile
IWG-4/9	Preferred 20/30 GHz MSS Feederlink Allocation Categories	7/5/94	JBT/Motorola
IWG-4/10	Rationale for Feeder Link Frequencies	7/5/94	WEC/Ellipso

IWG-4/11	Use of the 5000 to 5250 MHz Band for MSS Feeder Links (FAA Position)	7/5/94	FAA
IWG-4/12	Outline for Report of IWG-4	7/19/94	Chairman IWG-4
IWG-4/13 Rev 1	Spectrum Requirements for MSS Feeder Links (Draft Section 2 to Report)	11/8/94	LTA/LQP
IWG-4/14 Rev 1	Revision of Footnote 797A to Permit Use of the 5000-5250 MHz Band for MSS Feeder Links	8/16/94	SatTech Systems/LTA
IWG-4/15	General Comments on Frequency Sharing Between Multiple NGSO/MSS Systems	7/19/94	COMSAT Mobile
IWG-4/16	FSS Bands Not to be Considered in Future IWG-4 Work	8/12/94	Chairman IWG-4
IWG-4/17	Non-GSO Feederlink Issues	8/16/94	COMSAT Mobile
IWG-4/18	Spectrum Requirements for Ellipso (LEO E)	8/16/94	WEC/Ellipso
IWG-4/19	Liaison Note to Chair - IWG-4 MSS Feeder Links in the 13.75-14.00 GHz Band	8/12/94	Chair IWG-5
IWG-4/20	Comparison of Coordination Provisions	8/15/94	COMSAT World Systems
IWG-4/21	Table of Primary and Secondary Allocations in the Frequency Bands Under Consideration for MSS Feeder Links	8/15/94	COMSAT World Systems
IWG-4/22	Table of Coordination Scenarios	8/15/94	COMSAT World Systems
IWG-4/23	Considerations Relating to Choice of Frequency Bands for MSS Feeder Links (Draft Section 3 to Report)	10/18/94	WEC/Ellipso

IWG-4/24	Information Only Paper for IAC Use on the 15.4-15.7 GHz Band	11/8/94	WEC/Ellipso
IWG-4/25	Draft Text for Section 6 of IWG-4 Report of WRC-95 IAC	11/8/94	WEC/Ellipso
IWG-4/26	Section 4 of IWG-4 Report: Feeder Link Sharing Feasibility	11/8/94	COMSAT Mobile Communications
IWG-4/27	Characteristics of a proposed Ka-band GSO FSS system to provide global, two-way digital services between very small aperture terminals	10/20/94	Hughes
IWG-4/28	Information Document - Summary of Big LEO Feeder Link Proposals	8/11/94	COMSAT Mobile Communications
IWG-4/29	IWG-4 Interim Report	12/13/94	Chairman IWG-4
IWG-4/30	Task Group 4/5 Contribution to the Consolidated CPM Report	12/5/94	ITU-R TG 4/5
IWG-4/31	Draft Text for Section 5 of IWG-4 Report	12/10/94	Teledesic
IWG-4/32	AT&T Proposal concerning the agenda for WRC-97 and the future use of the 5.2 GHz band for high speed wireless data systems	10/12/94	AT&T
IWG-4/33	Reverse Band Working Feeder Links in the 13.75-14.00 GHz Frequency Band Sharing with Radiolocation/Radionavigation Services	9/20/94	DISA
IWG-4/34 Rev1	Characteristics of a Low Earth Orbit FSS and MSS Network for Operation in the Bands 27.5-30.0 GHz and 17.7-20.2 GHz	2/23/95	Teledesic
IWG-4/35	Co-Directional Sharing Between NGSO FSS Systems and NGSO MSS Feeder Links in the 30/20 GHz Band	11/22/94	Teledesic

IWG-4/36 Rev 3	Proposed Allocations for NGSO MSS Feeder Links Below 17.7 GHz for Inclusion in IWG-4 Report	3/6/95	LTA/LQP
IWG-4/37	Draft Proposals for NGSO MSS Feeder Link Allocations in the 4-6 GHz Range	1/18/95	COMSAT Mobile
IWG-4/38 Rev 1	U.S. Proposals in the Ku-Band for the 12.75-13.25 GHz, 13.75-14.00 GHz and 15.4-15.7 GHz Bands to Allow for Operation of NGSO MSS Feeder Links	2/2/95	WEC/Ellipso
IWG-4/39 Rev 1	Proposals for Ka-Band Non-GSO MSS Feeder Links	2/2/95	Motorola
IWG-4/40 Rev 1	Co-Directional Frequency Sharing Between NGSO MSS Feeder Links and NGSO Satellite Systems (FSS and MSS, Service and Feeder Links) in the 30/20 GHz Band	2/2/95	Teledesic
IWG-4/41	Sharing Between NGSO MSS Feeder Links and Terrestrial Services	1/18/95	LTA/LQP
IWG-4/42 Rev 1	Proposed Modifications to International Table of Frequency Allocations for 5000-5250 MHz Band	2/2/95	Telenergy/LQP
IWG-4/43	U.S. Allocation Proposal in C-Band for the 4.5-4.8 GHz Band to Allow for Operation of NGSO MSS Feeder Links	2/2/95	WEC/Ellipso
IWG-4/44	Support for Allocation of the 5000-5250 MHz Frequency Band for Feeder Link Frequencies	2/2/95	AirTouch Communications
IWG-4/45	Summary of Technical Characteristics of ELEKON-STIR NGSO MSS	2/2/95	EA Bobinsky Associates
IWG-	A response to Document IWG-4/40	2/2/95	Motorola

IWG-4/47	Proposed IWG-4 Interim Position on NGSO MSS Feeder Links Above 17.7 GHz	2/2/95	Reinhart/Hughes
IWG-4/48	Liaison Letter from IWG-5 to IWG-4 WRC-95 IAC	3/1/95	Chair, IWG-5
IWG-49	Spectrum Use by LEO-SAT-1 Network	2/23/95	Teledesic
IWG-4/50 Rev 1	Sharing Analysis in the 15.4-15.7 GHz Band to Accommodate Non-GSO MSS Feeder Links in the Space-to-Earth Direction	4/10/95	TRW
IWG-4/51 Rev 1	Co-Directional Frequency Sharing Between NGSO MEO MSS Feeder links and GSO Satellite System Service and Feeder links Operating in the 30/20 GHz Band	3/2495	NASA LeRC
IWG-4/52	Co-Directional Frequency Sharing Between NGSO MSS Feeder Links and NGSO Satellite Systems (FSS and MSS, Service and Feeder Links) in the 30/20 GHz Band	2/23/95	Teledesic
IWG-4/53	Co-Directional Frequency Sharing Between GSO FSS Systems and NGSO Satellite Systems (FSS and MSS, Service and Feeder Links) in the 30/20 GHz Band	2/16/95	Teledesic
IWG-4/54	Co-Frequency Sharing at Ka-Band Between GSO FSS and Non-GSO MSS Feeder link Systems	2/16/95	Hughes Space and Communications Company
IWG-4/55	Frequency Sharing Between FS Stations and Feeder/ Inter-Satellite Links of an NGSO MSS Satellite	3/1/95	Motorola SATCOM
IWG-4/56	Proposed Modifications to the Radio Regulations at Ka-Band Frequencies	2/16/95	Teledesic
IWG-4/57 Rev 1	Proposed Ka-Band and Allocations for Non-GSO MSS Feeder Links to be Included in the IWG-4 Report	4/11/95	TRW

IWG-4/58	International Regulatory Accommodations of Non-Geostationary Satellite Systems	3/1/95	Teledesic
IWG-4/59	Analysis of Feasibility of Sharing Co-Directional Use of the Fixed-Satellite 19 GHz Downlink and 29 GHz Uplink Bands Between the Geostationary Spaceway Fixed-Satellite System and Feeder Links of the Iridium LEO Mobile-Satellite System	2/23/95	Hughes Space and Communications Company
IWG4/60	Review of CPM-95 Sharing Studies Between 20/30 GHz GSO/FSS Networks and NGSO Feeder Links for MSS Operating in the 1-3 GHz Spectrum	4/11/95	Motorola
IWG4/61	Proposed Modifications to IWG-4 Interim Report	4/11/95	CSC
IWG4/62	Position of Hughes Space and Communications Company on Accommodation of NGSO/MSS Feeder Links at Ka Band	4/11/95	Hughes Space and Communications Company
IWG4/63	Co-Directional Frequency Sharing Between MSS Feeder Links of NGSO-MEO System and NGSO Satellite Systems (FSS and MSS, Service and Feeder Links) in the 30/20 GHz Band	4/10/95	Teledesic
IWG4/64	Sharing Study of Iridium and Spaceway	4/8/95	Hughes
IWG4/65	The Use of Earth Station Diversity and Automatic Power Control as Interference Mitigation Techniques in the Sharing of Spectrum Between the Geostationary Spaceway Fixed-Satellite System and Feeder Links of the Iridium LEO Mobile-Satellite System	4/11/95	Hughes